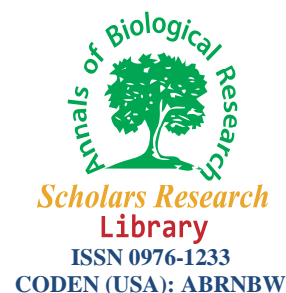




Scholars Research Library

Annals of Biological Research, 2013, 4 (5):212-215
(<http://scholarsresearchlibrary.com/archive.html>)



Study the effect of phosphate fertilizer (fertile₂), phosphorus and foliar nitrogen on yield and yield components of maize cultivar SC 704 in weather conditions of Kouhdasht

*¹Ali Minapour, ¹Ali Khourgami, ²Masoud Rafiee, ²Payam Pezeshkpour and ¹Hadis Nasrollahi

¹Department of Agronomy, Khorramabad Branch, Islamic Azad University, Khorramabad, Iran

²Department of Plant Physiology, Khorramabad Agricultural Research Center, Khorramabad, Iran

ABSTRACT

In order to study the effect of phosphate fertilizer (fertile₂), phosphorus, and foliar application of nitrogen on yield and yield components of maize cultivar SC 704 in weather conditions of Kouhdasht an experiment in the spring and in the summer of 2011 in Baghazal village as a split plot with three replications was conducted. First Factor: spraying nitrogen at three levels (1: no spray (control) 2: Once spraying (tasseling stage) 3: Double spray (corn emergence stage and pollinated). The second factor was Fertilizers biological phosphate (fertile₂) at two levels: (1: use 2: disuse) and the third factor: chemical fertilizer phosphorus at two levels: (1: use full recommended 2 - 1/2 recommendations based on soil test). Nitrogen foliar application significantly increased seed yield, biological yield, plant height, harvest index, TSW, and number of seeds per corn. So spraying nitrogen significantly cause increased corn yield and yield components. The highest seed yield belong to double spraying nitrogen, phosphate fertilizer (fertile₂), and 50% phosphorous treatment (10307.11kg/ha). Mean comparison results indicated that between the main factors in the eyes of yield, biological yield, TSW, number of seeds per corn, there was a significant difference.

Keywords: spraying, corn, bio-fertilizer phosphate (fertile₂), phosphate, yield

INTRODUCTION

Corn is one of the valuable crop plants that has high diversity, high adaptability and great nutrient value is in the row of the most important food crop in the world (Nurmohammadi et al, 2005). Corn has more genetic diversity compare than other cereals. According to World Food Agriculture Organization (FAO) in 2008, the area under maize cultivation was 93.6 million hectares that it was 9.8 percent of the total cultivated area of the world. So that corn between the cereal after wheat and rice is in third place. Corn belong to Greminea sub family and Panicoidae family and Zea sex that has many species. The best time for use phosphorous is at planting and mixed with soil and placing it alongside the planting rows. Transfer of phosphorus to seed is similar to nitrogen. In general, bio fertilizers are fertilizers materials that are include one or more species of beneficial soil organisms that are located in the bed of preservatives (Ekram and Salem, 2010). At first phosphorus transferred from cluster of corn, corncob and stalk, and then leaves too seeds (Noormohammadi et al, 2005). Many of the bacteria in the soil, especially bacteria of the genera Pseudomonas and Bacillus and fungi related to genera Penicillium and Aspergillus are able to phosphates insoluble in the soil to form a solution transforms. (Astarai et al 1996; By Boardi et al 2000; Kiani Rad 1995). Corn can uptake nitrogen with 2 forms(NO₃ and NH₄), but proper conditions NH₄ is ideal source for providing better nitrogen because it will take less energy to convert protein (Salardini, 2005; Khajehpour, 2001). Mahmoudi et

al (2008) showed that the effect of foliar application of nitrogen on the yield of three maize cultivars caused significantly increased seed yield. Darzi et al (2007) showed that the application of bio-fertilizer phosphate in the fennel plant could affect biological yield. Jahan et al (2009) showed that bio-fertilizers could be the best alternative to chemical fertilizers. Yousefi et al (2009) In study the effect of bio-fertilizer phosphate fertilizer (fertile2) on dry matter accumulation and yield components showed that spraying and bio-fertilizer had a significant effect on increasing seed yield and dry matter. The highest seed yield, TSW and number of seeds per corn under effect bio-fertilizer 50kg/ha observed. It seems that the application bio-fertilizer with chemical fertilizer is a good way to increase performance and reduce environmental pollution.

MATERIALS AND METHODS

In order to study the effect of phosphate fertilizer (fertile2), phosphorus, and foliar application of nitrogen on yield and yield components of maize cultivar SC 704 in weather conditions of Kouhdasht an experiment in the spring and in the summer of 2011 in Baghazal village as a split plot with three replications was conducted. First Factor: spraying nitrogen at three levels (1: no spray (control) 2: Once spraying (tasseling stage) 3: Double spray (corn emergence stage and pollinated). The second factor was Fertilizers biological phosphate (fertile 2) at two levels: (1: use 2: disuse) and the third factor: chemical fertilizer phosphorus at two levels: (1: use full recommended 2 - ½ recommendations based on soil test). During the growing season to determine, the physiological parameters six times samples collected from experimental plots.

The results of soil physicochemical properties are shown in the table (Table 1). Based on the soil analysis table, soil texture is loam.

Each plot as a treatment consists of 6 lines long, with length of 6 m and distance between lines was 75 cm. Distance between plants on lines was 20 cm. there were three seeds per each hill and at the proper time (four-leaf) one shrub that had better situation was maintenance and other plants removed. Based on the results of soil analysis 150 kg/ha triple superphosphate and 150kg/ha potassium sulfate from urea source 350 kg urea per unit area was used. All of the fertilizer(phosphorus and potassium)were used concur in 31 May 2011. Seed yield and biological yield at physiological maturity (black layer formed in the lower part of the grain), in 2 lines of plot were done with hem consider. With consider that SC704 is delayed variety when the seed moisture was 25% in 20 October 2011 were removed the plants.

MSTATC computer software was used for analyzing the data variance and comparing their mean (by Duncan Test), and the diagrams were drawn by Excel software.

Table1: Soil characteristics of the experimental site in Koohdasht, Iran where the experiment was conducted.

Texture	CU	ppm Zn	Mg ppm	Fe ppm	(%) C	ph	N (%)	EC(cm)	K ppm	P ppm	Depth cm
Loam	0.68	0.33	4.3	5	0.78	7.8	0.3	1.51	290	7	0-60

RESULTS AND DISCUSSION

Plant height

Analysis of variance showed that the main effects (spraying with nitrogen fertilizer, bio-fertilizer(fertile2) and chemical fertilizer phosphorus), the interaction between foliar nitrogen × fertilizer phosphate and triple interaction foliar nitrogen × bio-fertilizer(fertile2) ×N chemical phosphorus fertilizer on maize plant height were significant at the 1% level probability (table 2). Mean comparison showed that between levels of nitrogen foliar application, bio-fertilizer (fertile2) and chemical fertilizer phosphorus there were significant differences. The highest plant height (234 cm) obtained from twice-foliar × bio-fertilizer (fertile2) × 50% phosphate fertilizer and the lowest plant height (157.3 cm) obtained from the control factor × 50% phosphate fertilizers. In order to study the effect of biological and chemical phosphate fertilizers on corn plant, the results show that with use of biological and chemical phosphate fertilizer plant height was increased (Katalin et al. 2011).

Number of seeds per corn

Analysis of variance showed that the main effects (spraying with nitrogen fertilizer, bio-fertilizer(fertile2) and chemical fertilizer phosphorus), the interaction between foliar nitrogen × fertilizer phosphate and triple interaction

foliar nitrogen \times bio-fertilizer(fertile2) \times N chemical phosphorus fertilizer on seeds per corn were significant at the 1% level probability (table 2). Mean comparison showed that between levels of nitrogen foliar application, bio-fertilizer (fertile2) and chemical fertilizer phosphorus there were significant differences.

The highest number of seeds per corn (773.5 seeds per corn) obtained from twice-foliar \times 50 % of phosphate fertilizer and the lowest number of seeds per corn (383.167 seeds per corn) obtained from control factor \times 100% phosphate fertilizers \times phosphate fertilizer. The results of the investigation of Moussaovi Jangali (2005) on maize showed that in treatment that Mycorrhiza and bacteria revealed phosphate with chemical phosphate fertilizer was applied the maximum number of grains per corn obtained.

Thousand seeds weight (TSW)

Analysis of variance showed that the main effects (spraying with nitrogen fertilizer, bio-fertilizer(fertile2) and the interaction between bio-fertilizer(fertile2) \times chemical phosphorus fertilizer on TSW were significant at the 1% level probability and also the main effect of fertilizer phosphorus and interaction foliar nitrogen \times chemical were significant at 5% level probability (table 2).

Mean comparison showed that there was significant different between levels of foliar application with nitrogen fertilizer and the use of bio-fertilizer (fertile2) so that the highest TSW (224.83 g) obtained from twice spraying \times using fertilized 2 and the lowest TSW (119.67 g) obtained from control \times fertile2. Also there was significant different between the application of biological fertilized 2 and the use of chemical fertilizers Phosphate. The highest TSW (202.22 g) obtained from fertilize 2 \times 50% chemical fertilizer phosphate and the lowest TSW (128.55 g) obtained from disuse fertilize 2 \times 100% chemical fertilizer phosphate. Kazemi et al (2011) showed that the use of biological fertilizer (fertilize 2) increased TSW and cause reduced use of chemical phosphate fertilizers.

Seed yield

Analysis of variance showed that the main effects (spraying with nitrogen fertilizer, bio-fertilizer (fertile2) and the interaction between bio-fertilizer (fertile2) \times chemical phosphorus fertilizer on TSW were significant at the 1% level probability (table2).

Mean comparison showed that there was significant different between levels of foliar application with nitrogen fertilizer, bio-fertilizer (fertile2) and the use of chemical fertilizer phosphorus. That the highest seed yield (10307.11 kg) obtained from fertilized 2 \times 50% chemical fertilizer phosphate and the minimum seed yield (5838.55 kg) obtained from disuse fertilize 2 \times 100% chemical fertilizer phosphorus. Kazemi et al (2011) with study on corn plant showed that the use of bio-fertilizer (fertile2) cause increased seed yield and reduced amount of chemical phosphate fertilizer is used.

Biological yield

Analysis of variance showed that the main effects (bio-fertilizer (fertile2) and chemical phosphorus fertilizer) and the interaction between foliar nitrogen \times bio-fertilizer (fertile2) on biological yield were significant at the 1% level probability (table2). The main effect of foliar applications with nitrogen and the interaction of foliar nitrogen \times chemical phosphorus fertilizer and interaction of biological fertilizer (fertile2) \times chemical phosphorus fertilizers were significant at the 5% level probability (Table 2).

Mean comparison showed that there was significant different between levels of foliar application of nitrogen, bio-fertilizer (fertile2) and chemical fertilizer phosphate. The highest biological yield (26770.5) obtained from twice spraying \times using fertilized 2 and the lowest biological yield (16812.83) obtained from the control plots \times disuse fertilized 2. Also, between the levels of bio-fertilizer fertilized 2 and the use of chemical fertilizer phosphate there were significant differences so the highest biological yield (25223.16) obtained from twice spraying \times 50% chemical fertilizer phosphate and the lowest biological yield (16765.5) obtained from control factor \times 100% chemical phosphate fertilizers. Kazemi et al (2011) with study on corn plant showed that the use of bio-fertilizer (fertile2) cause increased biological yield and reduced amount of chemical phosphate fertilizer is used.

Harvest index (HI)

Analysis of variance showed that the main effects (spraying with nitrogen fertilizer, bio-fertilizer (fertile2) and chemical phosphorus fertilizer) and the interaction between foliar nitrogen \times chemical phosphorus fertilizers on HI were significant at the 1% level probability (table2). Double interaction between biological fertilizer (fertile2),

chemical phosphate fertilizer and triple interaction between bio-fertilizer (fertilize 2) × foliar nitrogen fertilization × chemical phosphate fertilizers were significant at the 5% level probability (table 2).

Mean comparison showed that there was significant different between levels of foliar application of nitrogen, bio-fertilize (fertilize 2) and the use of chemical fertilizers Phosphate. The highest harvest index (37.740) obtained from twice spraying× using fertilized 2 × 50% chemical fertilizer phosphate. Sarandon, et al (1990) concluded that the use of nitrogen in during heading cause made of more photosynthesis materials and at last increased harvest index. Moreover, other studies suggest this is the case.

Table 2: Variance analysis between traits measured

HI	Biological yield	Seed yield	TSW	Seeds per corn	Plant high	df	S.O.V
0/032 ^{ns}	2563383/111 ^{ns}	879166/361 ^{ns}	921/861 ^{ns}	962/750 ^{ns}	397/750 [*]	2	r
30/269 ^{**}	57275322/111 [*]	29844859/111 ^{**}	10430/861 ^{**}	122230/33 ^{**}	3740/250 ^{**}	2	A
95/072 ^{**}	198907340/444 ^{**}	58956802/778 ^{**}	13170/028 ^{**}	150414/694 ^{**}	8263/361 ^{**}	1	B
2/191 ^{ns}	98238823/444 ^{**}	781472/444 ^{ns}	819/361 ^{ns}	861/778 ^{ns}	103/861 ^{ns}	2	A×B
38/295 ^{**}	112409472/111 ^{**}	32802347/111 ^{**}	12571/361 [*]	128044/64 ^{**}	1560/250 ^{**}	1	C
33/386 ^{**}	5129077/444 [*]	1116995/444 ^{ns}	7531/694 [*]	118733/44 ^{**}	560/250 ^{**}	2	A×C
15/688 [*]	2105625/00 [*]	5128525/444 ^{ns}	8100/028 ^{**}	306/250 ^{ns}	164/694 ^{ns}	1	B×C
13/855 [*]	23550/333 ^{ns}	1846148/111 ^{ns}	406/861 ^{ns}	939/0 ^{ns}	572/194 ^{**}	2	A×B×C
3/980 ^{ns}	10169124/202 ^{ns}	4663017/210 ^{ns}	1651/891 ^{ns}	12643/023 ^{ns}	2183/833 ^{ns}	22	error
5.98	15.49	26.80	25.42	19.80	4.95		CV

Ns, *, ** are insignificant, significant at probability levels of 5 and 1 percent, respectively

CONCLUSION

The best performance obtained from the foliar nitrogen with bio-fertilizer phosphate (fertilize2) and 50% chemical fertilizer phosphorus recommendations based on soil test and this lead to higher performance in corn and in the other hand this lead to reform soil and reduce environmental pollution.

REFERENCES

- [1]Astarai, A., A. Kouchaki .1996. Application of bio-fertilizers in sustainable agriculture, agricultural emissions of Mashhad.
- [2]Baybourdi, M. M., Malakouti. M. Nafisi. 2000. Fertilizer consumption in order to optimize the production of sustainable agriculture. Dissemination of agricultural education.
- [3]Darzi, M.. Ter. Ghalavand, Rajaie, f. Vf. Safydkn .2007. Application of bio-fertilizers on yield and yield components of Fennel herb. 0.22 Investigation of Medicinal and Aromatic Plants (4): pp. 276-292.
- [4]Kazemi, n., S., Azarabadi., F, Khoi Rahimzadeh., N., Nazari. 2011. Comparison of different levels of phosphorus onCorn yield. First National Conference on Issues in Modern Agriculture University, Saveh.
- [5]Kiani Rad, M.1995. Impact of phosphate solubilizing microorganisms in the consumption of phosphate fertilizers in soybean Master's thesis, Faculty of Agriculture, Tehran University.
- [6]Khajehpour M. 2001. General Agriculture Center, Tehran University Press.
- [7]Katalin,j.,Attila,F.,Barnabas,B.2011. *Acta Bio.* 52(1): 67-71.
- [8]Mousavi Jangali, S, Sani, b. Sharifi, M. 2005. *Journal of agricultural science.* Second year. No. 1 on page 56.
- [9] Mahmoudi, c s, Yarniya. 2008. Effect of foliar nitrogen on corn yield 3 digits. Islamic Azad University of Tabriz. Crops of Crop Science Congress reform. Pp. 4277-4275.
- [10]Noormohammadi, Gh. S. A. Siadat.A., Kashani. 2005. Cereal crops. Martyr Chamran University Press.
- [11]Sarandon, H., Marvi H., 1990. *Journal of Iran agriculture Science.* 36(6): 1325-1331.
- [12] Yousefi.A., M. Galouie. M., A., Javaheri.2009. Biological Effects of phosphate fertilizer and fertilized with two foliar micronutrient elements on dry matter accumulation SC 704 maize yield components. Crops of Crop Science Congress reform. Pp. 4324-4322.